Application of the Bighorn Sheep Risk of Contact Model on the Okanogan-Wenatchee National Forest

Washington Conservation Science Institute

OWNF SO ~26 February 2016

Acknowledgments

- US Forest Service
- Washington Department of Fish and Wildlife

Introduction

- Objective:

  - Conduct risk of contact analysis:

    - for all bighorn herds on or within 35km of OWNF

    - use most recent version of the Risk of Contact Tool (2015)

    - Build upon 2013 effort including disease component

    - Summarize additional elements

United States
Department of
Agriculture

Forest Service

United States
Department of
Interior

Bureau of Land
Management

March 2015

**Bighorn Sheep
Risk of Contact Tool v2
User Guide**

Prepared by:

FS/BLM Bighorn Sheep Working Group

The model

- Models the probability that foraying bighorn sheep will leave their home range to reach domestic grazing allotments and return
    - Based on combination of:
        - Habitat suitability
        - Distance to the allotment
        - Herd composition (numbers and ram:ewe)
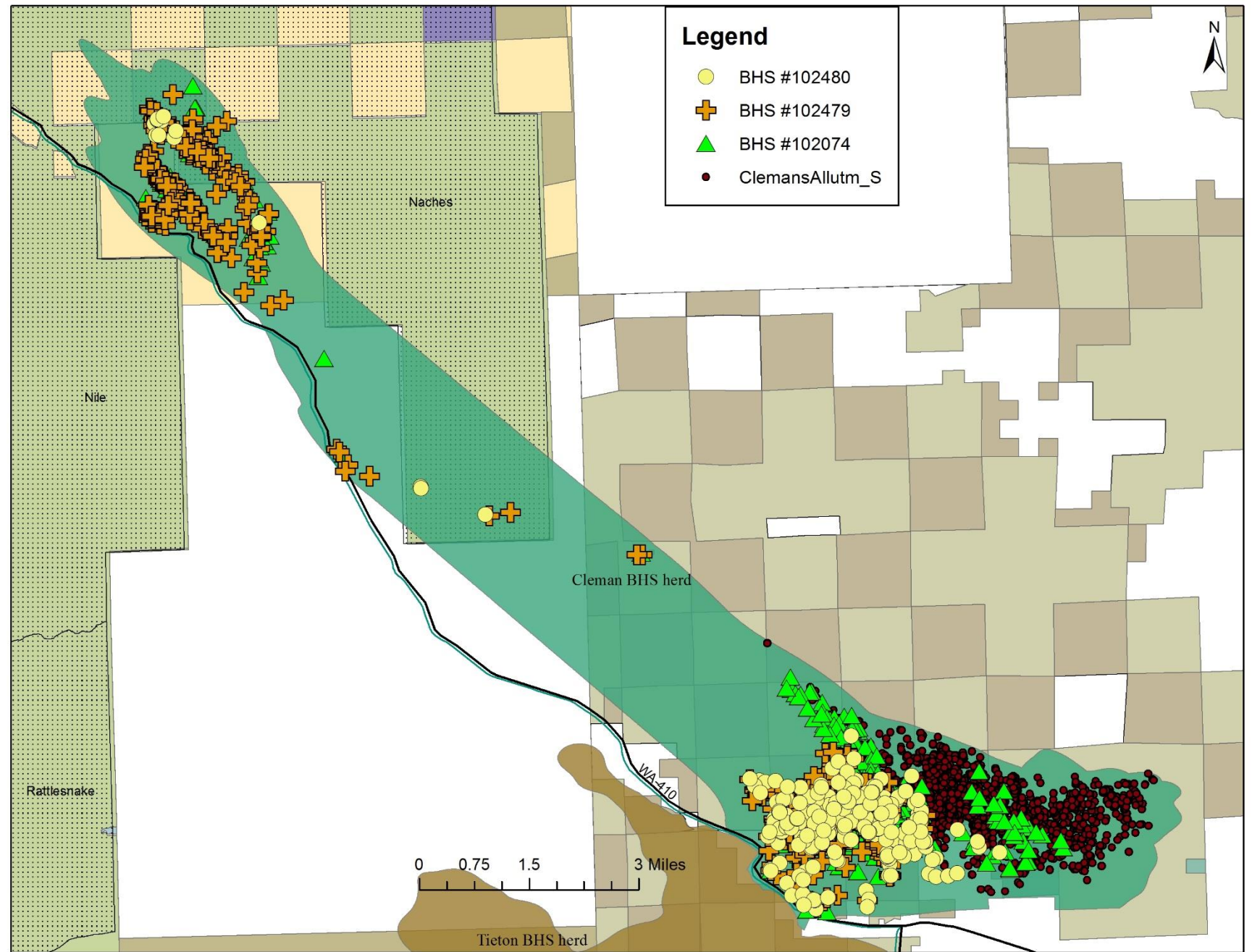   - Does NOT model interactions or disease contraction

Assessment Area
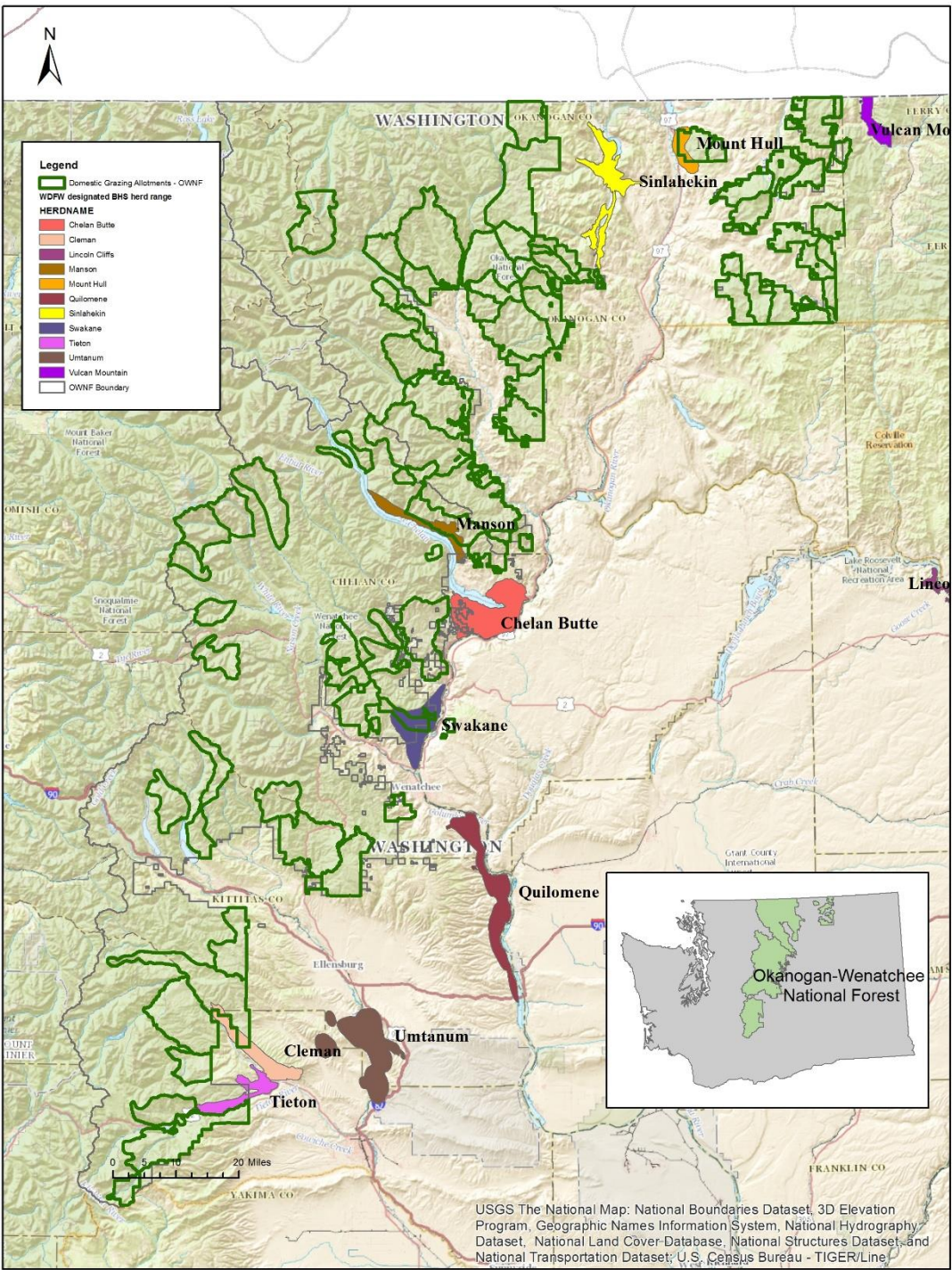
Methods

1. **Home Range Analysis**
2. **Foray Analysis**
3. **Contact Analysis**

Home Range

- WDFW provided GPS telemetry (2010 – 2013)
- Season of interest: summer, defined as May 15-Sept 15 (habitat map May – Oct)
- Two Versions CHHR:
  - GPS data ⟶ 95% kernel density
 - WDFW designated range
- Report includes lots of detail = repeatable

Rock Creek Herd

- 5 collared animals in Cleman Mountain herd

- 3 travel between Cleman and Rock Creek

- Difficult to demonstrate separate RC herd. No **collared** BHS in RC only.

- Only analyzed for Cleman Mtn.

Legend
- ○ BHS #102480
- ✚ BHS #102479
- ▲ BHS #102074
- ● ClemansAllutm_S

Naches

Nile

Cleman BHS herd

Rattlesnake

WA 410

0   0.75   1.5   3 Miles

Tieton BHS herd

Methods cont.

Foray Analysis

- Foray = a bighorn sheep leaves CHHR and returns

- Habitat

  - 3 components: Habitat, connectivity, non-habitat

    - Primary habitat components: suitable forage, suitable access to escape terrain, sufficient horizontal visibility

    - Connectivity: within 350m of habitat or within 525m if between two patches of habitat

    - Non-habitat: remainder

  - Group agreed accurate and adequate for OWNF assessment area (86/99%)

  - Preference: default values from Hells Canyon Dataset

Legend

Habitat Types WA Value

- habitat
- connectivity
- non-habitat
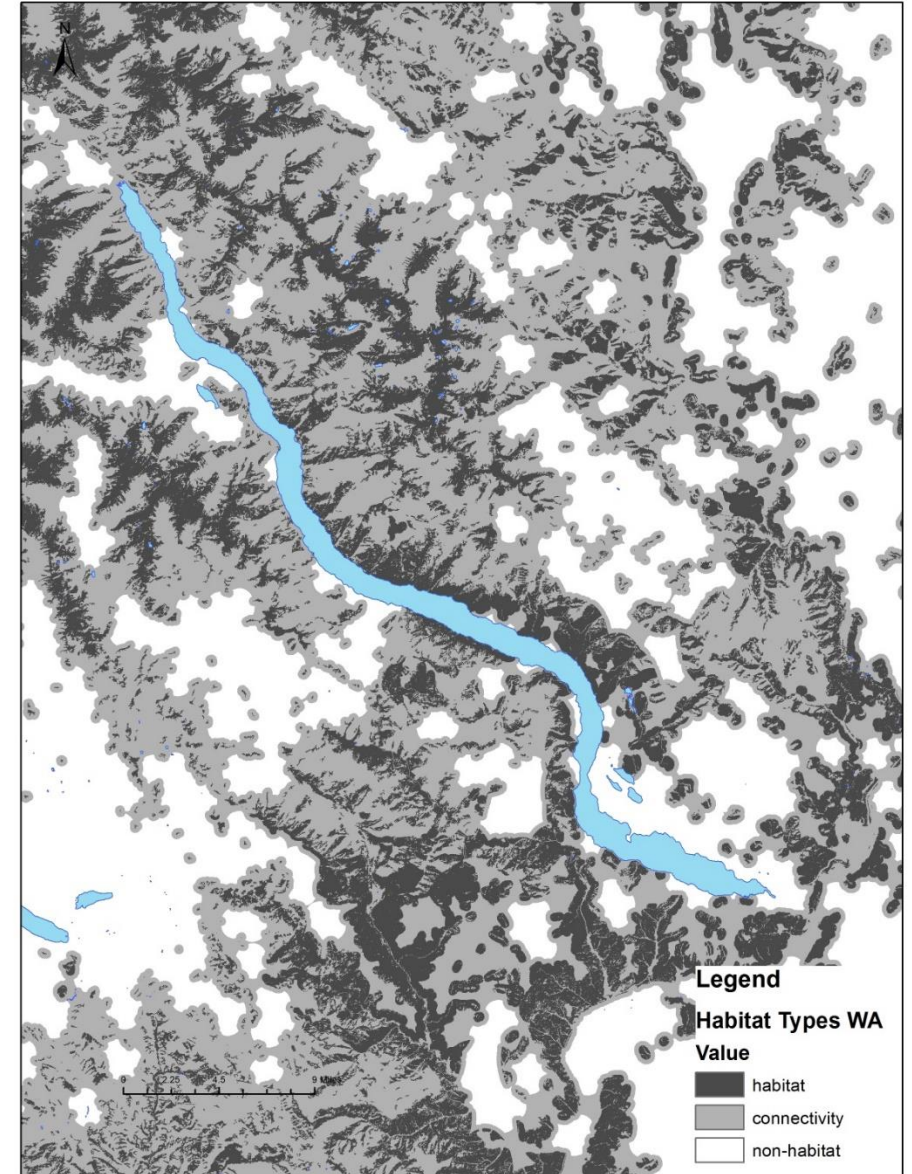
Methods cont.

Contact Analysis

- *Domestic Grazing Allotments*
  - OWNF active and vacant domestic grazing allotments.
    - all existing allotments
      - possible alternatives to existing domestic sheep allotments.
    - modified one active sheep allotment -Naches: *Naches North and Naches South*.
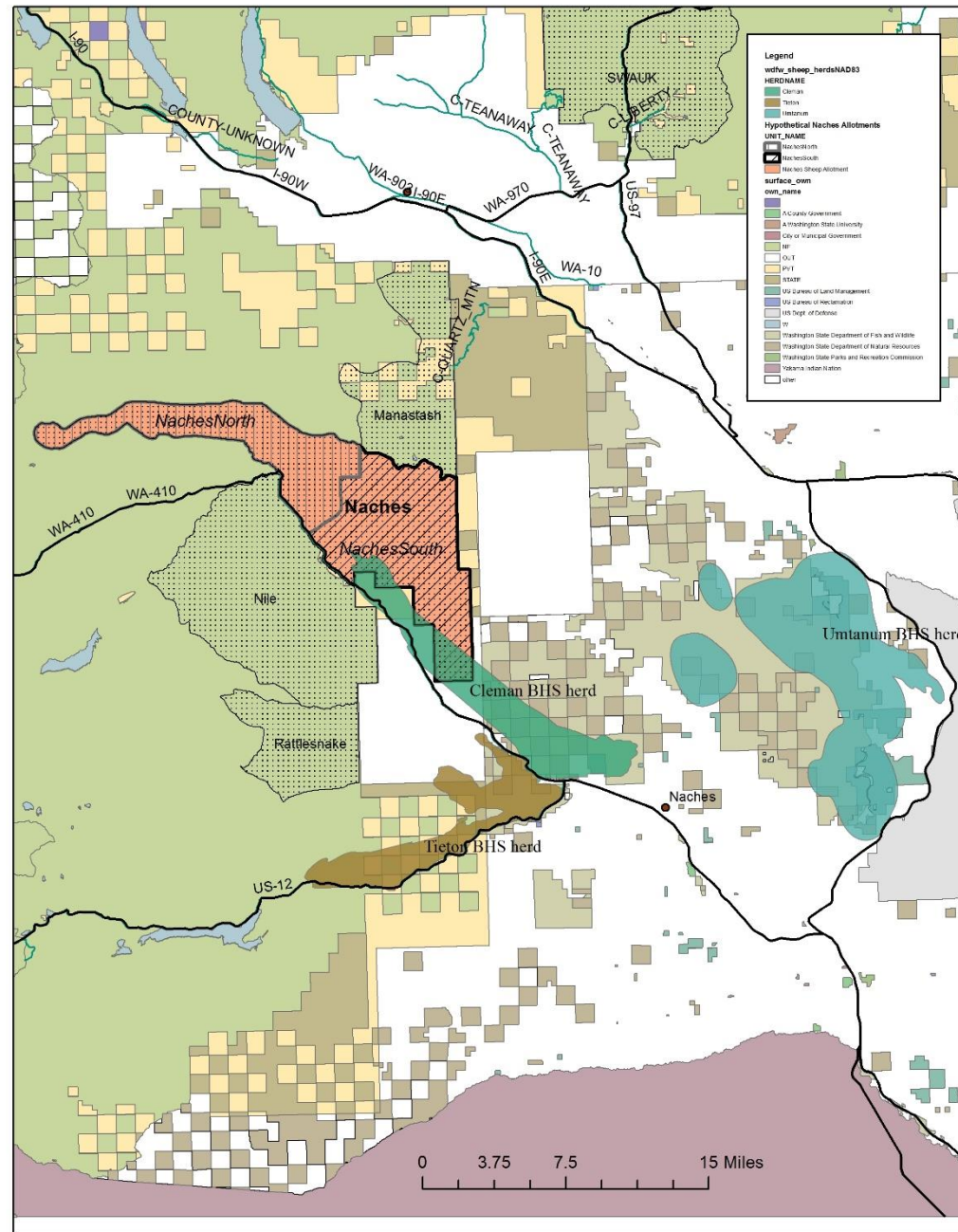
Methods cont.

Contact Analysis cont.

▶ *Bighorn Sheep Herd Size*

▶ *Sex Ratio*

   ▶ Rams more likely to foray

▶ *Foray Probability*

   ▶ Default: values represent the proportion of radio-collared individuals observed outside CHHR during summer

Proportion of ram forays reaching each ring (Summer)
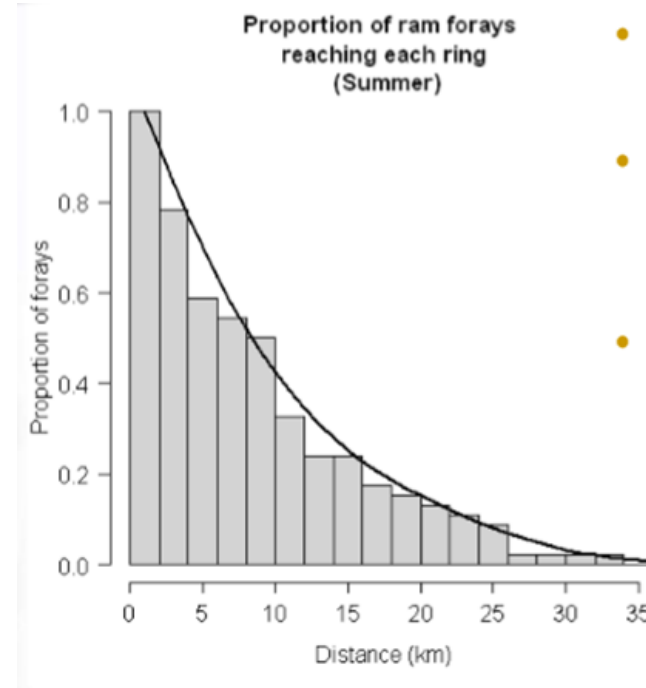
- Ram forays often exceed 10 km.
- In HC telemetry data, max ram foray: 35 km max ewe foray: 54 km
- Observed HC foray distances consistent with other reports.

Methods cont.

Disease Analysis

▶ Currently no guidance on amount of time required to recover from a disease outbreak but observations suggest likely takes several decades.

▶ a moderate level of outbreak events (ie. 0.25), which would lead to an average outbreak period of 50 years, has been suggested as a potential benchmark to ensure population persistence

▶ management scenarios that allow for disease free intervals of at least 50 years recommended by the Bighorn Working Group.

▶ assume a moderate probability of a contact with an allotment resulting in an interspecies contact that will result in a disease transmission outbreak event (0.25), then need to see a rate of contact of **<0.08** contacts per year.

▶ summarized annual contact rates for each herd and calculated the likelihood of a disease outbreak in 50 years.
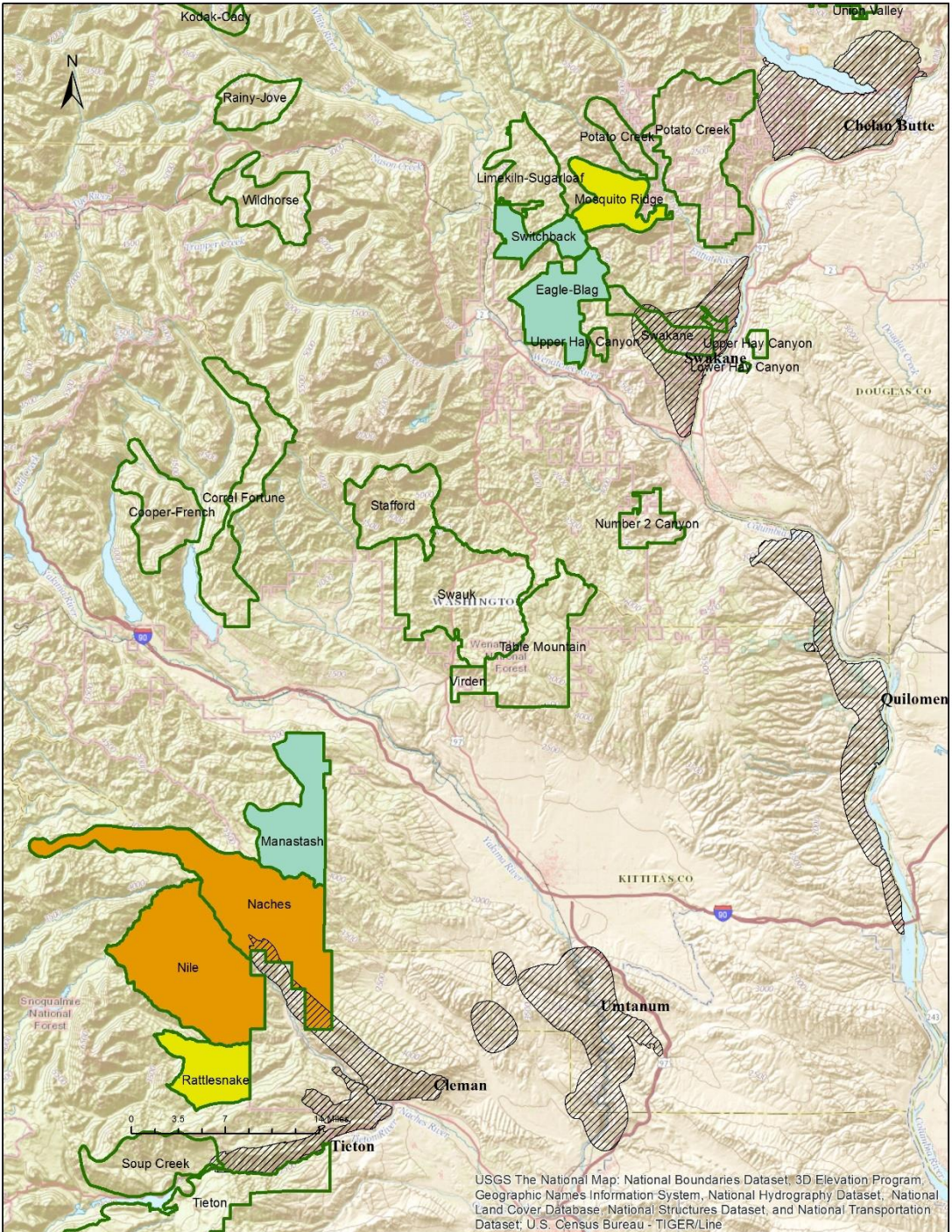
Results

▶ Cleman Mtn.
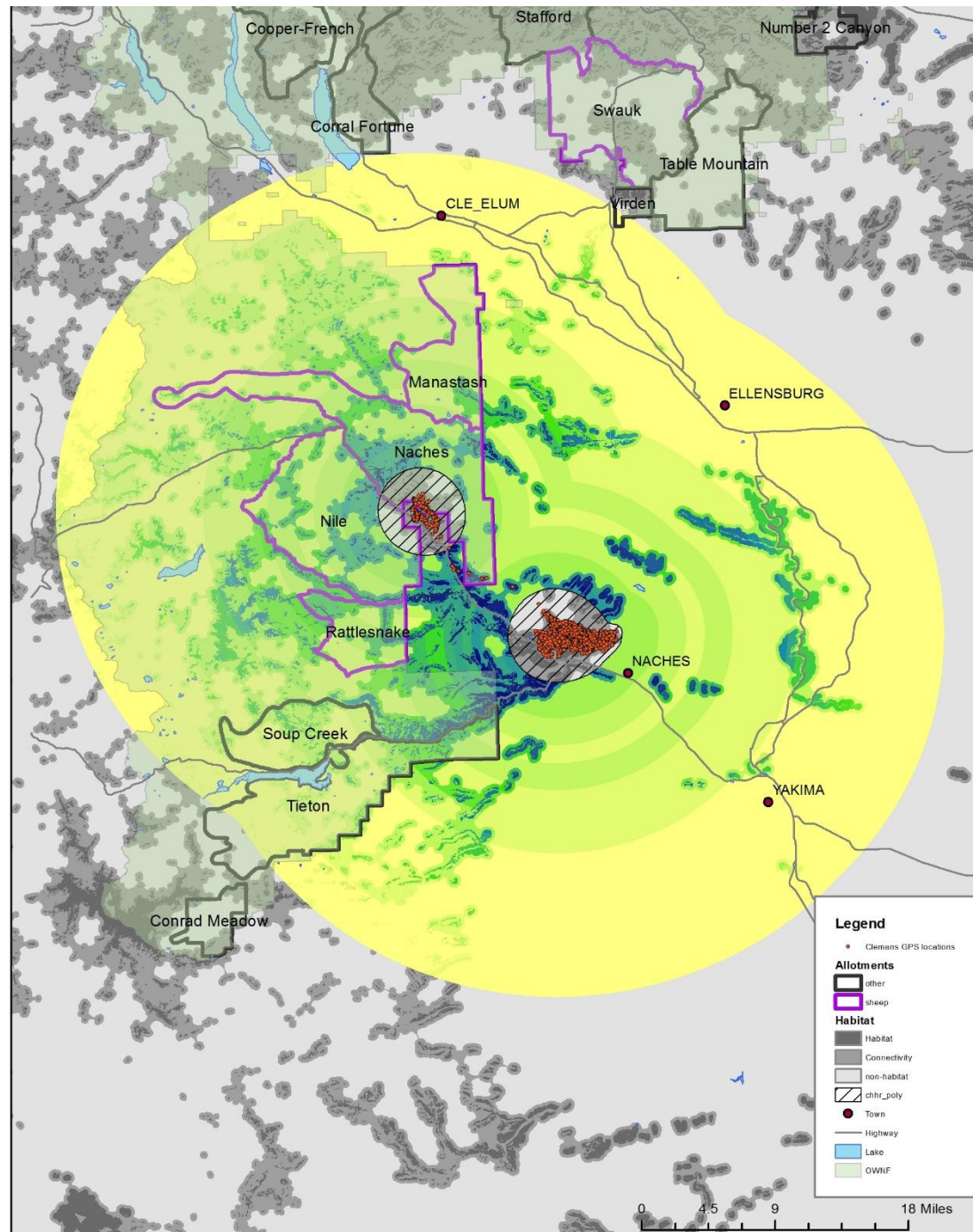
Results cont.

Bighorn Sheep Herd	Active Sheep Allotment	Single_Ram	Single_Ewe	All_Rams	All_Ewes	All_Herd
Chelan Butte	Mosquito Ridge	<0.01	<0.01	0.10	0.01	**0.11**
	Switchback	<0.01	<0.01	0.02	<0.01	0.02
	Limekiln-Sugarloaf	<0.01	<0.01	0.02	<0.01	0.02
	Eagle-Blagg	<0.01	<0.01	0.01	<0.01	0.01
Cleman Mountain	Rattlesnake	0.01	<0.01	0.65	0.03	**0.68**
	Manastash	0.01	<0.01	0.26	0.01	**0.27**
	Naches					*intersects
	Nile					*intersects
Manson	Mosquito Ridge	<0.01	<0.01	0.01	<0.01	0.01
	Limekiln-Sugarloaf	0.00	<0.01	<0.01	<0.01	<0.01
Quilomene	Eagle-Blagg	<0.01	<0.01	<0.01	<0.01	0.01
	Swauk	<0.01	<0.01	<0.01	<0.01	<0.01
Swakane	Eagle-Blagg	0.02	<0.01	0.81	0.03	**0.84**
	Mosquito Ridge	<0.01	<0.01	0.21	0.01	**0.22**
	Switchback	<0.01	<0.01	0.11	<0.01	**0.11**
	Limekiln-Sugarloaf	<0.01	<0.01	0.05	<0.01	0.05
	Swauk	<0.01	<0.01	0.01	<0.01	0.01
Tieton	Naches	0.01	<0.01	0.16	0.02	**0.18**
	Rattlesnake	0.01	<0.01	0.15	0.02	**0.17**
	Nile	0.01	<0.01	0.10	0.01	**0.12**
	Manastash	<0.01	<0.01	0.01	<0.01	0.01
Umtanum	Naches	<0.01	<0.01	0.11	0.02	**0.13**
	Manastash	<0.01	<0.01	0.01	<0.01	0.02
	Nile	<0.01	<0.01	0.01	<0.01	0.01
	Rattlesnake	<0.01	<0.01	<0.01	<0.01	<0.01

HERD	Sheep Allotment	All_Herd	Number of contacts per decade	Number of contacts per 50 years
CHELAN BUTTE	Mosquito Ridge	0.11	1.1	5.5
CLEMAN MOUNTAIN	Rattlesnake	0.68	6.8	34.1
	NachesNorth	0.42	4.2	20.9
	Manastash	0.27	2.7	13.6
	Naches and Nile			intersect
SWAKANE	Eagle-Blagg	0.84	8.4	42
	Mosquito Ridge	0.22	2.2	10.8
	Switchback	0.11	1.1	5.6
TIETON	NachesSouth	0.19	1.9	9.6
	Naches	0.18	1.8	9.2
	Rattlesnake	0.17	1.7	8.4
	Nile	0.12	1.2	5.8
UMTANUM	Naches	0.26	2.6	13
	NachesSouth	0.26	2.6	13

Results cont.
Modify allotments

HERD	Sheep Allotment	All_Herd	Number of contacts per decade	Number of contacts per 50 years	Outbreak expected in 50 years?
CLEMAN MOUNTAIN	*NachesNorth*	0.42	4.2	20.9	Yes
	Naches	*intersects	NA	NA	NA
	NachesSouth	*intersects	NA	NA	NA
UMTANUM	Naches	0.26	2.6	13	Yes
	NachesSouth	0.26	2.6	13	Yes
	NachesNorth	0.01	0.1	0.6	No

Additional viability components…

1. Use the model to evaluate relative suitability of modified or new allotments on the OWNF.

2. Consider risk of contact with domestic sheep occupying areas that are not administered by the OWNF.

3. Identify management practices with the goal of separation between domestic and bighorn sheep where necessary to provide for Forest-wide bighorn sheep viability. Examine how these practices affect the risk of contact values.

4. Identify obstacles on the landscape that may be preventing or reducing the risk of contact (i.e. wildlife fences) but are not currently incorporated into model.

5. Assess spatial and temporal overlap of bighorn sheep core herd home ranges with domestic sheep use areas and driveways.

6. Use the model to evaluate relative suitability of different potential bighorn sheep reintroduction sites in a landscape containing numerous private domestic sheep flocks.

7. Consider other elements that contribute to viability such as habitat suitability, risk of mortality from automobiles, population size in relation to genetic diversity, etc.

8. Consider impacts of human recreation activities within bighorn herd boundaries.